

Daily GLOWBUGS

Digest: V1 #10

via AB4EL Web Digests @ SunSITE

Purpose: building and operating vacuum tube-based QRP rigs

[AB4EL Ham Radio Homepage @ SunSITE](#)

%%%% GlowBugs %%%% GlowBugs %%%% GlowBugs %%%% GlowBugs %%%%

Subject: glowbugs V1 #10

glowbugs

Friday, April 18 1997

Volume 01 : Number 010

Date: Thu, 17 Apr 1997 11:39:48 -0400 (EDT)

From: JOHN SEHRING <JOHN_SEHRING.parti@ecunet.org>

Subject: XFMR CORE SATURATION

To: glowbugs@www.atl.org

> >There is only one minor problem. You cannot feed the bucking DC
> >current through the filament windings from a low-impedance or constant
> >voltage source; you will short out the audio. It would be better to
> >derive this current from a constant current source which would have a
> >very high impedance.

> Yes, you're right. I had completely neglected that consideration.

Why does that happen?

-John Sehring (Wed, Apr 16, 1997 12:32 pm MT @Baker, Montana) UCC WB2EQG

Date: Thu, 17 Apr 1997 09:10:56 PDT

From: "Jeff Duntemann" <jeffd@coriolis.com>

Subject: Burden's Suplus Center catalog report

Hi gang--

Just got a catalog from Burden's Surplus Center. They're mainly a hardhat tinkerer's catalog (used hydraulic pumps & cylinders, trailer parts, and so on) but they have a few intriguing items.

1. Page 124. 230V to 115V isolation transformer, 100W, \$9.99. These make good power transformers for rigs you can run on 275V or so.

2. Page 125. A military surplus transfer for 115V input, outputs 6.3V @ 3A and 315V @ 20 mils. On the surface that's 7W, but military transformers are conservatively rated. For CW work, I'll bet you could pull 30 mils, depending on how that effected regulation. And even so, this would be ideal for a 5W input 1-tube rig, and the price is wonderful: \$3.99. It could also power a simple receiver, especially if you don't need a lot of audio output.

3. Page 163. A flattish military ammo box 14" X 9" X 4". \$5.99. This suggests a chassis, and apart from the problems of working in steel (have your chassis punches handy!) I'll bet you could build a very rugged little radio in it.

Slim pickins for radio work, but it can't hurt to have the catalog on file.
I buy motors and other mechanical stuff from them for my other hobbies.

\$1.95 handling, shipping extra. No mention of a minimum order.

Burden's Surplus Center
1015 West "O" Street
PO Box 82209
Lincoln NE 68501-2209
1-800-488-3407

- --73--

- --Jeff Duntemann KG7JF
Scottsdale, Arizona

Date: Thu, 17 Apr 97 13:05:15 EDT
From: JOHN_SEHRING.parti@ecunet.org
Subject: XFMR CORE SATURATION

To: glowbugs@www.atl.org

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Why does that happen?

-John Sehring (Wed, Apr 16, 1997 12:32 pm MT @Baker, Montana) UCC WB2EQG

Date: Thu, 17 Apr 1997 13:21:13 -0500
From: bill@skeeter.frco.com (William Hawkins)
Subject: Re: XFMR CORE SATURATION

>Why does that happen?

Now that's interesting. I know you can't short turns on an audio xfmr because I did that to the first 20W amp I built. The output xfmr had lotsa different wires for a selection of output impedances. I took the 8 ohm pair and taped up the rest. Couldn't get any power out of the amp. Turns out the wires that I taped up (at the age of 11) had been stripped and tinned, so they were shorted together. Ran fine after that got straightened out.

But I've seen some RF amps where there appears to be a tap that shorts out part of the coil to change bands. Can you do that at RF? Maybe because it's air core?

Regards,
Bill Hawkins bill@skeeter.frco.com

Date: Thu, 17 Apr 97 13:15:14 EDT
From: JOHN_SEHRING.parti@ecunet.org
Subject: XFMR CORE SATURATION

To: glowbugs@www.atl.org

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> >very high impedance.

> Yes, you're right. I had completely neglected that consideration.

Why does that happen?

-John Sehring (Wed, Apr 16, 1997 12:32 pm MT @Baker, Montana) UCC WB2EQG

Date: Thu, 17 Apr 1997 11:09:55 -1000
From: "Peter L. Demmer" <ampruss@hits.net>
Subject: Re: New Baby Regen

Eric;

Congradulation on the birth of your new Re-genny. You are an the right track. The RF amplifier variable screen (tetrode) is the best place to start on it's growth. Minimum (your 2/3 turn) link is a good design. Variable coupling built like a battle ship is the way to get the best possible (repeatable) results. Take the plate and screen down to a minimum (35-45vdc). It is a long fun trip to developing and acheiving the ultimate Regenny RCVR. 72/3 Peter KH6CTQ

Date: Thu, 17 Apr 1997 17:59:02 -0400
From: "Steve, N2MNN" <n2mnn@openix.com>
Subject: RE: A. Earhart's Radio

After reading "The Sound of Wings", by Mary S. Lovell, a few years ago, I am convinced she died because of lack of concern over radio communications.

Pg 231

"Much thought was given to the radio equipment... Western Electric supplied 50W trans...(13A), and a 4 band receiver (20A)...Transmitted on 3105 and 6210 kcs.....and 500 kcs....250 foot aerial was required for 500 kcs..."

I was just browsing through the book to help my recollection. But some of the following may be taken out of context.

Later, she discarded the 2 keys that came with the radio and depended on voice. She also discarded the 250' aerial. The under carriage aerial never worked satisfactorily. Vincent Bendix donated some cash since she was always in financial difficulty. The W.E. radios were discarded, and replaced with Bendix radios. I believe the Bendix radio never performed satisfactorily, probably because its operation was never understood. One note in a later chapter said a picture of the cockpit shows the radio above the pilot windshield. Conjecture is that she probably hit her head on it on impact.

All during the last flight the US Navy had plenty of DF equipment in the area. But she always seemed to be on the wrong frequency for best propagation, and she never stayed on frequency for more than a few seconds. So the Navy never got a fix on her even when she was not lost.

Eric, if you want to borrow the book, I can ship it to you.

Steve, N2MNN
n2mnn@openix.com

Date: Thu, 17 Apr 1997 20:00:29 +0000
From: "Brian Carling (Radio G3XLQ / AF4K)" <bry@mnsinc.com>
Subject: Re: DXing (fwd)

SCN, you are still using the OLD Glowbugs address.

Please address your glowbug messages to:

glowbugs@www.atl.org

That way everyone will see them.

I suggest that if they are going to continue with BOTH groups that you simply send a copy to that address aaAND to the "older" group at:

glowbugs@sco.theporch.com

I have little experienc with Hammarlunds but maybe someone else reading this can advise you -

Bry

On 17 Apr 97 at 15:15, SCN User spoke about DXing (fwd) and said:

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> FWD: help needing bringing Hammarlund back to life!
>
>      i                      NorthWest QRP Club
>
>      _____
>  ==[scn]==
>  --0---/\--
>      )|(                      nwgrp@scn.org
>      /^\^\/  ^^
>      /_|\_ \                  http://www.scn.org/IP/nwgrp      --NW
>  QRP--
>
>  ----- Forwarded message -----
>  Date: Thu, 17 Apr 1997 08:34:10 -0500 (CDT)
>  From: rlandman@ix.netcom.com
>  To: nwgrp@scn.org
>  Subject: DXing
>
>  Hi Brian!
>
>  Well, I think I have a find (or a way to kill a lot of time):
>
>  Last night I was over at the Voc school (I'm now an advisor to the
>  electronics class) and the teacher (Paul) wants to clean house a
>  bit. I spotted a Hammarlund HQ-170A (vacuum tube type rcvr that
>  covers 1.8MHz - 54 MHz) and asked if I could have it and he said,
>  sure so I lugged it home.
>
>  I just fired it up this morning (once I found a fuse cap and some
>  knobs). The dials light up and the S-meter even moves (it has a
>  clock on it to automatically turn it on so you don't miss your
>  favorite station, hah!). Plugging in an old set of earphones, all I
>  get is a bit of crackle which moves in sync to the S-meter. Also
>  turned on my old RF signal generator and discovered that this thing
>  is not working (no big surprise - that's why it was donated to the
>  school, no doubt). Have B+ and all tubes seem to have ok filaments
>  (they light up or are warm to the touch). Interesting item is that
>  two of the tubes in the tuning circuit have their filaments kept on
>  even when the power is off (some At least no capacitors blew up and
>  I don't see any charred parts or obvious signs of a failed part.
>  So, I will need a schematic diagram to go any farther. Wonder if
>  anyone in your Ham group would have an instruction book I could have
>  a copy of? Any suggestions as to how to go about finding one?
>
>  This should make for some interesting troubleshooting. I haven't
>  tried to fix a radio in, hmm, let's see, 30+ years? I need to brush
>  up on my radio theory anyhow (blow out the cobwebs) so this seems to
>  be a practical way to do it. I have a ton of old tubes and if it is
>  one of them. hopefully I have what I need. I think Paul may have a
>  tube checker (and if so I'll try to get that too). When I retire,
>  I'd like to fix up a few old radios (like the one in the livio\ng
>  room) to fool around with. Maybe I can help Paul and teach a bit of
>  radio (tubes are easier to understand, I think, than transistors,
>  when you are starting out - Prof Paul Nalin at UNH agrees and wrote
>  a book titles "The ScienBob
>
>
>
>

```

*** 73 from Radio AF4K / G3XLQ in Gaithersburg, MD USA *
** E-mail to: bry@mnsinc.com *
*** See the great ham radio resources at: *
** <http://www.mnsinc.com/bry/> *

Date: Thu, 17 Apr 1997 19:59:42 -0400
From: "Ornitz, Barry" <ornitz@eastman.com>
Subject: RE: XFMR CORE SATURATION

Constant voltage or constant current sources are idealized concepts, but they can be approximated quite well in practice - especially with circuits using operational amplifiers and feedback. Their output impedance can be calculated quite easily from just Ohm's Law in a small-signal analysis: the resistance is the change in output voltage divided by the change in output current.

For a voltage source, the voltage should change little with current changes. A VR tube, for example, might produce a change in voltage of 3 volts for a current change of 30 mA producing a dynamic resistance of 100 ohms. A zener diode generally has a dynamic resistance of a few ohms or less. Finally, one of those IC voltage regulators like an LM7805 can produce a dynamic output resistance of 0.01 ohms (10 millivolts change for a 1 amp change in current).

In a current source, the current changes very little with voltage changes. For example, look at a pentode's current as a function of plate voltage at a constant grid voltage. Once you get above the initial rise and the "blip" where the screen voltage is greater than the plate voltage, the current levels off and becomes relatively constant as the plate voltage is increased. In a pentode, think of dynamic plate resistance which can be as high as a megohm; the plate current becomes a function of essentially only the grid voltage.

In the transformer application, the constant voltage source would have a very low impedance to the audio - shorting it out. A constant current source would present a high impedance to the audio which is OK.

However this application is still not so simple, as Mike Silva pointed out. The current source still needs a high voltage compliance as explained in my later note to the group.

73, Barry L. Ornitz WA4VZQ ornitz@eastman.com
alternately ornitz@tricon.net

>From: JOHN SEHRING [SMTP:JOHN_SEHRING.parti@ecunet.org]
>>>There is only one minor problem. You cannot feed the bucking DC
>>>current through the filament windings from a low-impedance or constant
>>>voltage source; you will short out the audio. It would be better to
>>>derive this current from a constant current source which would have a
>>>very high impedance.
>
>Why does that happen?
>

Date: Thu, 17 Apr 1997 20:11:48 -0500 (CDT)
From: mjsilva@ix.netcom.com (michael silva)
Subject: Re: simple 80m transmitter

You wrote:

>
>Hi gang,
> Well I had time to kill last night, so I was looking thru a copy of
>the 1954 radio amateurs handbook. What did I find but a nice little
>rock bound 80m set, look on page 154 for the start, the unit uses a
>single 6AG7...

What's interesting to me about the circuit is the fact that both of the
pi-network capacitors are 365 uuF. I'm used to seeing maybe half that
on the plate side, and two or three times that on the antenna side. A
similar or identical circuit is used in slightly earlier handbooks with
both capacitors being 150 uuF. This version was built on a piece of
plywood.

73,
Mike, KK6GM

Date: Fri, 18 Apr 1997 04:37:35 +0000
From: Sandy W5TVW <ebjr@worldnet.att.net>
Subject: Re: simple 80m transmitter

At 01:11 AM 4/18/97 +0000, you wrote:

>You wrote:
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>>the 1954 radio amateurs handbook. What did I find but a nice little
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>similar or identical circuit is used in slightly earlier handbooks with
>both capacitors being 150 uuF. This version was built on a piece of
>plywood.
>
>73,
>Mike, KK6GM
>
>

A lot of stuff designed then was "by rote". Also, whaever was
available or in the junkbox would dictate what was used! We are nearing
that type of "parts crisis"
today as new parts become scarcer and scarcer!

73
E. V. Sandy Blaize, W5TVW
"Boat Anchors collected, restored, repaired, traded and used!"

417 Ridgewood Drive,
Metairie, LA., 70001
ebjr@worldnet.att.net
Looking for: 860 tubes, WL-460 tubes
Butternut HF2V antenna, G-R test gear.....*

Date: Fri, 18 Apr 1997 11:11:55 +0200
From: Jan Axing <janax@li.icl.se>
Subject: Re: XFMR CORE SATURATION

Interesting. There was a discussion in the NG rec.audio.tubes about how to use a push-pull output transformer in a single ended circuit. The idea was nearly the same, buck the idle current by adding a constant current sink to the other end of the primary winding. The sink must have a high impedance, again to avoid shorting out the AC. One way to obtain a high compliance current sink is to use a power pentode and increase its plate resistance with a cathode bias resistor. The discussion ended before a viable solution popped up. One problem is the bias current shift in the amplifier tube caused by generation of even order harmonics at high levels. This could also be a problem if the modulated RF tube also shifts its bias current.

The discussion forked into another thread. This is crude but bring out a hacksaw and cut an air gap in the xformer core. In the case of an EI core, a cut must be done in both the outer legs. Primary inductance will be reduced but by avoiding low frequencies one may get away with it.

73

- --

Jan, SM5GNN
Linköping, Sweden
janax@algonet.se
janax@li.icl.se

Date: Fri, 18 Apr 97 09:09:37 EDT
From: jkh@lexis-nexis.com (John Heck)
Subject: 2.5 Volt Power Transformers For Sale.

Folks,
Subject sounds a little funny but these are NOS/NIB power transformers with 2.5v filament windings for those who want to make use of the older type tubes. Please reply via private email. Please note that AES is asking 3 times plus for like transformers.

POWER TRANSFORMERS FOR SALE
All in excellent+ condition and, of course, never used.

STANCOR VPT-1 (Victory Model) (for 6-8 tubes)
325-0-325 70ma
5v 9 amp
2.5v C.T. 3 amp
Horizontal half shell
Box ratty but with instruction sheet
\$20 NIB

STANCOR P-6003 (for 6-8 tubes)
350-0-350 70ma
5v C.T. 3 amp
2.5v C.T. 9 amp
Horizontal half shell
Box nice and with instruction sheet
\$20 NIB

FMA #9342 (for 4-6 tubes)
325-0-325 50ma
5v 3 amp
2.5v C.T. 1.75 amp
Horizontal half shell
Box OK with enough remains of the instruction sheet to get specs.
\$15 NIB

Date: Fri, 18 Apr 1997 8:35:00 -0600
From: Alex Mendelsohn <alexm@pennwell.com>
Subject: FW: DXing (fwd)

The HQ-170 was the cat's meow when it came out in the late Fifties. To troubleshoot it, I'd test all the tubes, then give it a thorough visual inspection. Next, check the power supply voltages. If up to snuff, use conventional troubleshooting techniques. Start at the loudspeaker and work back, testing the audio output, then the audio pre-amps, then the detector, then the IF, then the mixer, then the RF amplifier, and finally the antenna circuits.

I have a 1938 Hammarlund HQ-120 here that I use quite a bit, and use it competitively in the Antique Wireless Association's annual Old Timer Radio tests. It's a great receiver. The manual goes out of its way to indicate that the bandswitch uses solid silver contacts, not inlaid types! neat, eh? Have fun with the HQ-170. If you want to get rid of it, let me know; I'm interested.

Vy 73, Alex, AI2Q in Kennebunk, Maine .-.-.

From: Brian Carling (Radio G3XLQ / AF4K)
To: ALEXM; Multiple recipients of list
Subject: Re: DXing (fwd)
Date: Thursday, April 17, 1997 7:14PM

SCN, you are still using the OLD Glowbugs address.

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That way everyone will see them.
I suggest that if they are going to continue with BOTH groups
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>      _____
>  --[scn]--
>  --0---/\---
>      )|(                      nwgrp@scn.org
>      /\^\/ ^^\
>      /_|\_      http://www.scn.org/IP/nwgrp          --NW
>      QRP--
>
>  ----- Forwarded message -----
>  Date: Thu, 17 Apr 1997 08:34:10 -0500 (CDT)
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>
>
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*** 73 from Radio AF4K / G3XLQ in Gaithersburg, MD USA *
** E-mail to: bry@mnsinc.com *
*** See the great ham radio resources at: *
** <http://www.mnsinc.com/bry/> *

Date: Fri, 18 Apr 1997 10:35:15 -0400
From: "Greg Parsons A.K.A. Rat" <gregp@MIS.Net>
Subject: Re: simple 80m transmitter

Mike,

You are quite right, I got home last night, and the handbokk I was looking
at was the 1953 not 54... it was a long day here yesterday. Now I am diging
thru the parts boxes to see if I have all the parts to build it. So far so
bad...

73,
Greg
ke4ooo

At 08:11 PM 4/17/97 -0500, you wrote:

>You wrote:

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>plywood.

>

>73,

>Mike, KK6GM

>

- - - - -

Greg Parsons	KE4000	gregp@mis.net	gregp@lfucg.com	gregp@stdio.com
AMI #865	DoD 862	Who has the coffee? Better yet, who has the Ale8one?		
NRA Life, SCCA, SCA	http://www.stdio.com/~gregp		http://www.lfucg.com	
"Religiones antiquae et arma ridiculae non comparant cum bono telo eruptionis igneae latero te, puer." Hanno Solare				

Date: Fri, 18 Apr 1997 11:00:02 -0400 (EDT)

From: rdkeys@csemail.cropsci.ncsu.edu

Subject: Re: simple 80m transmitter

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> on the plate side, and two or three times that on the antenna side. A
> similar or identical circuit is used in slightly earlier handbooks with
> both capacitors being 150 uuF. This version was built on a piece of
> plywood.

Generally, it really does not matter that much (no flak folks, I know the purists with KW amps into 50 ohms will differ, but, practically speaking it does not matter) whether or not the capacitors are the same in value or differ. In the early days, when Art Collins published his Pi-Net tuner in QST (around 1933 or so), it was used to tune open line of 450/600/800 ohms or end fed antennas. Thus the impedance transformation was not as much as is today, and equivalent capacitor values were used with good effect. In WWII, with the ART-13 output network, tuning into a short aircraft wire, it was a different story. But, remember that it also had a set of three 50 or 100pf fixed caps on a little aluminum plate, with binding posts to add capacity to the L network and make it a true pi-network output circuit into some sorts of antennas. On aircraft it was mostly an L-network into almost zero ohms antenna. When we got high and mighty into 50 ohm resistor antennae, things changed. Then the impedance transformation generally was several thousands of ohms into 50 ohms. For best Q and practicality, the values of input and output capacitors were set to be about a 5-10:10 ratio in values.

For glowbugging use, into end fed or open wire lines (as opposed to 50 ohm line resistor antennae), similar values of capacitance work very well. You need to consider 1) the resonance point of the final tank (determined by the input capacitor and the tank coil), and 2) whether or not you are feeding a low or a high impedance antenna (odd or even number of quarter waves). All the plate tank circuit has to do is tune to resonance. The plate capacitor and the tank coil can be shorted to ground (it won't hurt it at all, as long as it is shunt fed, and we should be shunt feeding our toys to keep high voltages off our open tanks and caps, right?). Obviously, don't short it to ground for DC if it is series fed, but so short it to ground for RF if it is series fed, and run the following test.

Test 1. --- check for resonance dip on the plate meter. With the tank RF shorted to ground, find the resonance point for the desired band. Generally, by rules de thumbe, at 160M, you will want about 200pf at resonance, at 80M, about 100pf, at 40M and 30M about 50pf-75pf, and up higher, 20-50pf will generally do. Adjust your coils to match these capacitance values at resonance. The tolerances are not highly critical.

Then, hows ye gonna couple outta dat dere shorted tank..... hint, enter the Pi-Network. Generally speaking, you have to tap up from that ground short to get any useful antenna output current. How can you do that. Well, you could just tap up from ground at whatever impedance is appropriate. That works fine, but requires a lot of mechanical tapping, and is not as good at rejecting harmonics as everyone likes. You can make a very nice variable RF tap, by inserting a big variable capacitor in place of that ground short on the tank circuit. Now whattayagot. Well, if the capacitor is fully meshed and big as ever (anything over 500-600 pf we will call biggie up to 2000pf or more), you can mesh it and have your RF short back. That is not good for the average antenna but is good on a 3-4 ohm vehicular or aircraft antenna. Keep unrolling that thing and you increase the impedance of that tap --- up to 50 ohms --- up to 72 ohms and so forth up to 300 ohms up to 600 ohms, etc. That is your basic pi-network, simply an RF tap up from ground on the tank circuit. To see the impedance effect on the capacitance require in the output circuit, run Test 2.

Test 2 --- Take various sizes of household lamps from 4 watt xmas tree bulbs to 200 watters, and attach them to your antenna output across that output capacitor. Adjust for maximum loading or rf output and check the values of capacitor needed to make it match correctly. On small bulbs (several hundred ohms cold) it will take much less capacitance than on a 200 watter (which is around 5 ohms cold).

Now to the problem of what size output capacitor to use. Well, that is actually rather simple, if you consider the antenna you are using, again. 50 ohm line resistor antennae, that are low impedance, use about 5 x the input tuning capacitor, minimally, and opt for about 7 x the input tuning capacitor. Consider your average DX-60'ish kind of box. It uses a 150pf or so input capacitor and a 1000 pf output capacitor. That is about 7:1 or so. That will generally work fine in almost all 50 ohm line resistor antennae designs. You may want to be a little more persnickety if you are running a KW 4-1000 amp, but that will probably apply well there, too. OK, now what about using equal sized input and output capacitors? Well, that can be done simply, too. But, you need to think of an intermediate impedance output point of maybe 500-600 ohms, thusly --- if you make your input and output capacitors about 250-300pf on the low bands (160/80/40M), and fully mesh the output capacitor and about 3/4 mesh the input capacitor on 160M, half mesh it on 80M, and 1/4 mesh it on 40M, and then adjust your coils to resonate, you will have a good match to roughly 500-600 ohms or so. That will work great for the end fed high impedance antennae and the open wire line fed antennae. What about that odd number of quarter waves like me favorite end fed 3/4 wave wire? Well, that is simple, merely add a 1/4 wave matching section, called a sufficient coil to the antenna end of the output capacitor to make the output network an L network (series coil and capacitor to resonate at your chosen frequency). That will transform the 500 ohms down to the low ohms of the end fed low impedance wire. That way, you can get away with equivalent sized input and output capacitors on your pi-network/pi-L-network output tank circuit in that glowbugge final. Works fine for me on a 6AG7 up to a pair of 813's. Nothing magical, just a little common sense to remember just exactly which impedance is where. For glowbugging use, it is much easier to follow a few simple rules de thumbe rather than slipsticking it into formulae, because it is so cut and dried. The tolerances are entirely non-critical in most ham applications (overstressed sweep tubes and biggie amplifiers are sometimes an exception that may require a dash of formulae flipping), and suited to almost any junk box set of capacitors

if you adjust your tank coils accordingly, and remember which points are at what RF impedances to ground.

On your little rig with the dual 365pf caps, it will work fine into the average open-wire fed antenna or higher impedance end fed wire thingie. It would be pushing it into a 50 ohm line resistor antenna, unless you added some additional output circuit capacitance (on 80M probably around 300 more would be best, but on 40M, it may reach it OK, as is), or used a series coil to make it a pi-L-network. My guess is it was designed for the end fed wire or the open-wire line fed antenna, for which case it a pretty much right on. Just make sure the plate tuning cap has sufficient spacing to prevent arcing if you run it highly voltaged.

Caveat, but the simple rules de thumbe (AKA KISS) approach works for me, and has for a long, long time.

73/ZUT DE NA4G/Bob UP

Date: Fri, 18 Apr 1997 10:56:33 -0700 (PDT)
From: tomrice@netcom.com (Tom R. Rice)
Subject: Fast xtal delivery!

Surprise! In the mailbox this morning was found a package from Phoenix Crystals with my 40-meter set. Pretty durned good service, I'd say, as I mailed the order on April 4th.

Gimme a few more days to get the 6T9 rig finished and there'll be some gb activity from out here in CA land, even if with just a li'l ole dipole.

- --

"It's lots of fun having fun, even if you don't enjoy it!"
-- Gracie Allen

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CIS: 71160,1122

End of glowbugs V1 #10

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Created by **Steve Modena, AB4EL**
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